

GAMGEE'S "PHYSIOLOGICAL CHEMISTRY"

Physiological Chemistry of the Animal Body. By Arthur Gamgee, M.D., F.R.S., Brackenbury Professor of Physiology in the Owens College, Manchester. Vol. i. (London: Macmillan and Co., 1880.)

THE title of this book, since it seems to indicate that the work treats of a division or kind of chemistry, suggests the question whether it ought not to have been written (and reviewed) by a chemist rather than by a physiologist. And indeed there was a time when the view that the chemistry of living beings was a kind of chemistry distinct from the ordinary chemistry had some measure of support, and when consequently the phrase physiological chemistry had a very definite meaning. At the present time however all or nearly all are ready to admit that the chemical events which take place in living bodies are in reality of the same kind as and subject to the same chemical laws as those which take place in lifeless things; and hence physiological chemistry has come to mean the same thing as chemical physiology. The study of the chemical phenomena of animals and plants may be undertaken either by the chemist who understands physiology or by the physiologist who knows chemistry. The day must sooner or later come,—may its advent be more speedy than the present outlook promises!—when the chemist will be able, on the strength of his general knowledge, to foretell with sureness and precision the varied chemical events of the animal body; but hitherto and as yet, each chemical twist and turn of the vital machine has to be worried out by direct observation and experiment, so that physiological chemistry really means at present the physiological investigation of the chemical phenomena of living beings, and thus naturally falls into the hands of the physiologist.

For some years past there has been a great want of an adequate English treatise on the subject, a treatise which should deal with the matter much more fully and completely than could possibly be done in the text-books of physiology or chemistry. The preparation of such a treatise, however, is a task of great labour, and Prof. Gamgee assumed a heavy responsibility when he undertook to bring out the work, the first volume of which is now before us. But we believe that we may congratulate him and his readers on the accomplishment, so far, of his task.

The first instalment comprises, besides a preliminary chapter on proteids, an account of the chemistry of blood, pus, lymph, and of the elementary tissues, contractile, nervous, connective, and epithelial. About 200 pages are devoted to blood alone, and these not only contain a full description and discussion of the phenomena of coagulation, of the chemistry of the serum, and of the red corpuscles, both of their stroma and their hæmoglobin, but include a special chapter "on the changes which the blood undergoes in disease," and a section on the "characters presented by the blood of invertebrate animals." Prof. Gamgee's object has been apparently threefold, viz., (1) to give the chemical data as fully and as exactly as possible, with abundant references to original memoirs and other authorities; (2) to explain even in detail the methods by which the data are determined, and in this the reader will have at once his attention

arrested and his progress assisted by the illustrations of apparatus, spectra, &c., the number and excellence of which form a very striking feature of the work, distinguishing it in a most marked manner from its predecessors; and (3) to point out and discuss the physiological bearings of the data expounded. Thus under the heading of "Oxy-hæmoglobin" will be found a description of the various methods of preparation of this substance (some eight special methods being given in detail in small print), followed by an account of its elementary composition, crystalline form, general reactions, and absorption-spectra. The physiological properties of hæmoglobin are in large measure postponed to the chapter on respiration; but the *technique* of spectroscopic examination is fully described, including the method of recording absorption-bands in wave-lengths; and hæmatin, with other derivatives and allies of hæmoglobin, as well as the action of carbonic oxide and other gases, are treated at length. The account of blood ends with a "description of certain methods of research not described in preceding sections," such, for instance, as the determination of the specific gravity of blood, the quantitative estimation of its various constituents, normal and abnormal, the extraction and measurement of the gases of blood, the measurement of the total quantity of blood in the body, &c., &c.

The other parts of the book are written in a similar fashion, and as far as we have at present, from the sections which we have subjected to a more detailed examination, been able to judge, the author has spared no pains to insure accuracy in his facts and statements, as he has certainly shown judgment in his selections, while his descriptions are remarkably clear and easy to understand.

The prominence given to methods, and the richness in illustrations, make the book one of great value to the student. There are books, some of them professedly written for students, which, though of much worth in other respects, are from the student's point of view practically useless: books of which the student's own judgment is that "he cannot find what he wants" in them. We venture to think that it will be the student's own fault if he cannot find what he wants in Prof. Gamgee's work; that is to say, if he wants what he ought to want. If he seeks in it a compendium which will give him just that amount of knowledge which may be required for an examination, so prepared as to be most easily absorbed and retained for the few weeks which precede his ordeal, he will very probably be disappointed. But if he desires to understand the chemistry of the animal body he will find it an admirable guide, and especially a most valuable book of reference. Throughout the whole of physiology, and at least no less in the chemical than in other parts, the value of the data and the trustworthiness of the conclusions founded on them depend very largely on the methods employed; and no student can form an intelligent judgment on the chemical phenomena of the body who has not understood and appreciated the methods by which the various investigations have been carried out. Hence we lay especial stress on this feature of the book before us as most important for the student.

Prof. Gamgee has gone largely into detail and even into controversy; and in this point too we think he is right. The outlines of physiological chemistry are already present in the various text-books of physiology; what

was emphatically wanted was a history and discussion of details to give shape and fulness to the more meagre accounts found elsewhere. Doubtless many will say that the work contains a great deal more than can possibly be wanted by the student of medicine or even of physiology. We will not presume to answer the difficult question, How little physiology a medical student may know without his educational status being considered "mean"; but this we may say, that there is not a page in this work, the study of which will not prove profitable not only to the medical student, but even to the medical practitioner.

We trust that the author will as soon as possible be able to complete a work of which the first part will increase his already high reputation, and certainly must be regarded as a most noteworthy addition to English physiological literature. M. FOSTER

PEAT-MOSSES

The Sphagnaceæ or Peat-Mosses of Europe and North America. By R. Braithwaite, M.D., F.L.S. (London: David Bogue, 1880.)

THE peat-mosses are a peculiarly interesting group of cryptogamic plants, which has attracted the attention of even ordinary observers from a very early period. No group of plants is more clearly defined in structure, in family likeness, and by the localities in which they are found. The wanderer over our moorlands, the sportsman in pursuit of game, are as familiar as is the botanist with their dense green or ruddy-coloured tufts, now covering over some damp spot or filling up some bog hole with a vast mass of vigorous vegetation. Nor is there wanting to them an economic value, and that of too great an importance to be overlooked by even the most careless, for it is past generations of these bog-mosses which form the vast deposits of peat, for which as an article of fuel no substitute is in many parts of Europe attainable. The name sphagnus was first used, by writers like Theophrastus and Pliny, to indicate some of the spongy lichens, but was restricted to a genus of mosses by Dillenius more than a century and a half ago, "which were like none of the terrestrial mosses, but were produced always in bogs and marshes."

Dr. Braithwaite, in the volume before us, gives a most excellent sketch of the literature of the genus, tracing it from Dillenius, Linneus, Hedwig, to Müller, Wilson, Sullivant, Schimper, Lindberg, and others. For a long time Prof. Schimper's work was the best on the subject, and Dr. Braithwaite mentions it as very complete in its details of structure, both descriptive and pictorial, and as leaving hardly anything to be desired. Of works more especially relating to the development and minute anatomy of the group, allusion is made to the important memoirs of von Mohl, Carl Nägeli, Dozy, Hofmeister, Russow, Piré, and Rozé. He then proceeds in a second chapter to some general observations on collecting, preparing, and on the points to be observed in the determination of a species.

In a third chapter the vegetative system of the group is discussed. To our mind this chapter might well have been extended. The details given of the germination of the spores are too few, nor is the following chapter on the reproductive system free from the same defect; and as to the illustration of these two chapters, it will suffice to mention that it is confined to a single plate. As the

charming plates illustrating the descriptive portion of the work are, we trust, likely to serve for more than one edition of it, we would suggest that, in the event of a second edition, some half-dozen supplementary plates might be given, on which would be represented the embryology of the group.

Between fifty and sixty species of *Sphagnum* are known, of which about one-third are tropical. They are most abundant in the north and south temperate zones, in the higher latitudes of which they often cover over a large expanse of surface. Dr. Braithwaite describes twenty species as found in Europe and North America, that is about one-third of all the known species. Of the others, seven species are described as from Brazil, seven from Central America, four from Guadaloupe, seven from Australia and New Zealand, four from the Eastern Archipelago, two of these, *S. sericeum*, C. Müll., and *S. Holleanum*, Dozy and Molk, known only in a barren state, but remarkable for having the stem leaves precisely like the branch leaves in form and structure, their hyaline cells being without fibres, but with a single apical pore. The only species from tropical Africa is *S. Africanum*, Duby.

Dr. Braithwaite points out that the range of variability in the species is in this group most extensive, so that in their determination one must rely on minute anatomical distinction for their essential characters, as in many cases size, colour, direction of leaves, habit, presence or absence of fibres in the hyaline cells of the stem leaves, will all alike fail. In the separation of the *Sphagninæ* as a subclass from the *Bryinæ* or frondose mosses, Dr. Braithwaite follows the earlier views of the illustrious Schimper. He groups the species described in nearly the same manner as Lindberg, adopting his three sections—*Eusphagnum*, *Hemitheca*, and *Isocladius*. The European species are all located in the first section. The descriptive details are very clearly given. The synonymic lists are evidently made out with great care, and the varieties which in many of the species are, as is well known, very marked, are not only described, but in several cases figured. The twenty-eight beautiful coloured plates illustrating the species and varieties are all from drawings by the author, and they contain complete anatomical details of the stem and leaf structures. The work is brought out in a style worthy of the subject, and we trust will find its way not only into the hands of the botanist, but, as it well deserves to do, into the possession of all who take an intelligent pleasure in studying our native mosses.

OUR BOOK SHELF

Vox Populi: a Sequel to the "Philosophy of Voice." By Charles Lunn. (London: W. Reeves, 1880.)

WE are told in the preface that "the present work is a reprint of articles that appeared in the *Orchestra*," and that "now it has been discovered Galen (A.D. 180), 'the father of physicians,' as he is called, advanced the same physical views as those for which I (Mr. Lunn) have contended, my controversial work is ended:—it is scarce worth while to re-write." Was it then worth while to re-print? In the introduction the author tells us that his articles were written "to clear up some ambiguous points in my (Mr. Lunn's) 'Philosophy of Voice,'" and that "this without the former work is incomplete, as that